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## Important Questions for Class 11

### Biology

#### Chapter 9 – Biomolecules

**1 Mark**

**1. Which is the important energy carrier in the cell?**

**Ans:** Adenosine triphosphate (ATP)

**2. Name the monomer subunits which form Nucleic acids?**

**Ans:** Nucleotide

**3. What are macromolecules? Give an example.**

**Ans:** Macromolecules are big complicated molecules found in intercellular fluid in colloidal form. They are polymeric in nature since they are generated by the condensation of low molecular weight micromolecules. Examples: polysaccharides, proteins, and nucleic acids.

**4. Identify the polymer which makes the exoskeleton of insects.**

**Ans:** Chitin is a glucosamine polymer that forms the exoskeleton of insects.

**5. Name the following: i) sugar present in DNA ii) Base not found in DNA.**

**Ans:** (i) Deoxyribose sugar

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(ii) Uracil

**6. Why are proteins called biological polymers?**

**Ans:** Proteins are referred to as biological polymers because they can perform numerous activities such as protection, mechanical support, transportation, and mobility.

**7. Which molecule has the capacity to duplicate?**

**Ans:** Deoxyribonucleic acid (DNA)

**8. Name the abundant proteins in the biosphere?**

**Ans:** RUBISCO

**9. Lipids are not biomacromolecules, why?**

**Ans:** Since the molecular weight of lipids does not reach 800, they are not biomacromolecules.

**10. Which lipid can cause heart ailment?**

**Ans:** Cholesterol

**11. What are micro- nutrients?**

**Ans:** Micronutrients are vitamins and minerals that the body needs in small amounts.  
Example: Mn, Co, Zn, B, etc.

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**12. Why do oils generally remain in liquid state even in winters?**

**Ans:** Oils are considered as unsaturated lipids, so they have lower melting points.

**13. Name an element found in proteins but not in lipids and carbohydrates.**

**Ans:** Nitrogen

**14. What is the difference between RNA and DNA in terms of nitrogenous base?**

**Answer:** RNA contains adenine, guanine, cytosine and uracil whereas DNA contains adenine, guanine, cytosine and thymine. So, RNA has uracil instead of thymine.

**15. What does an enzyme do in terms of the energy requirement of a reaction?**

**Ans:** The main function of enzymes in terms of energy requirement of a reaction is to lower the activation energy of reaction.

**16. What is the function of ATP in cell metabolism?**

**Ans:** ATP, or adenosine triphosphate, is the cell's energy currency. It is a molecule having unstable high-energy bonds.

**17. Name the protein which forms the intercellular ground substance.**

**Ans:** Collagen.

**1. Differentiate between nucleotides & nucleosides?**

**Ans:** (i) Nucleotide composed of base, sugar and phosphoric acid whereas nucleoside consists of nitrogenous base and sugar.

(ii) Nucleotide RNA is called ribonucleotide and nucleotide of DNA is called deoxyribonucleotide whereas nucleoside of RNA is called deoxyribonucleotide and nucleoside of DNA is called deoxyribonucleotide.

(iii) Examples of nucleotide are adenylic acid, guanylic acid, thymidylic acid and uridylic acid and examples of nucleoside are adenosine, guanosine, cytidine, thymidine and uridine.

**2. How are glycosidic bonds formed?**

**Ans:** A monosaccharide's glycosidic or ketone group can combine and bond with an alcoholic group of another organic chemical to connect the two components together. This is referred to as a glycosidic bond.

**3. What do you mean by steady state?**

**Ans:** An open system is always in a steady state, which means that the rate of energy and matter input is always equal to the rate of energy and matter output.

**4. What is metabolism? Mention the role of enzymes in metabolism?**

**Ans:** Metabolism is described as the combination of the body's life functions. Enzymes are responsible for directing metabolic pathways. Catalysts are enzymes. Enzymes are organic catalysts that are highly specialized and are created by living cells. Biochemical pathways are the sequences of reactions that occur in cells. Enzymes direct metabolic pathways in the desired direction. They have an

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active site. The substrate binds to the active site of the enzyme, resulting in the formation of an enzyme substrate complex.

### **5. Why are enzymes called biocatalysts?**

**Ans:** Catalysts are chemicals that affect the rate of a chemical reaction without changing the equilibrium point of the reaction. Enzymes are the organism's catalysts, and they are created in the live cell. As a result, they are referred to as biocatalysts.

### **6. Give the functions of carbohydrates?**

**Ans:** (i) Carbohydrates play an important role in all metabolic reactions in the body and are generated as intermediate chemicals in process pathways.

(ii) Nucleic acids contain ribose and deoxyribose sugars.

(iii) During breathing, glucose is oxidized to provide energy.

(iv) Glucose is used in the production of both lipids and proteins.

### **7. What do you mean by activation energy?**

**Ans:** The energy necessary to start a chemical or biological reaction is known as activation energy. Activation energy eliminates the energy barriers of the reactants, which occur due to the presence of electrons on their surface and the lack of precise and powerful collisions required to bring the reactive sites of the chemical together.

### **8. List the different types of lipids.**

**Ans:** Lipids are classified into three types:

(i) simple lipids: they are alcohols or triglycerides containing fatty acid and glycerol.

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(ii) Ingredient lipids: These are simple lipids that contain a physiologically active compound, for example. Lipoprotein (protein + lipids), glycolipids (carbohydrate lipids)

(iii) Derived lipids: These are hydrolyzed derivatives of simple lipids such as fatty acids and alcohol.

### **9. Enlist three properties of enzymes?**

**Ans:** (i) An enzyme is substrate specific and catalyzes only one reaction due to the unique shape of the active site and substrate.

(ii) Each enzyme requires a specific temperature to work properly.

(iii) The enzymes are pH sensitive, and each enzyme exhibits maximum activity at a certain pH known as the optimum pH.

### **10. Enumerate differences between DNA & RNA?**

**Ans:** DNA

(i) It is made up of a double helical of two polynucleotide chains.

(ii) Deoxyribose sugar is found in the nucleotides.

(iii) In DNA, pyrimidine bases are thymine and cytosine.

(iv) All of the genetic information is contained in DNA.

RNA:

(i) It is made up of only one helical of single polynucleotide chains.

(ii) Ribose sugar is also found in the nucleotides.

(iii) In RNA, pyrimidine bases are uracil and cytosine.

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(iv) RNA helps in the synthesis of protein.

### **11. Why are monosaccharide's sugars known as reducing sugars?**

**Ans:** Since monosaccharide's sugar have a free aldehyde or ketone group and can reduce  $\text{Cu}^{2+}$  to  $\text{Cu}^+$ , They are known for reducing sugars. Since disaccharides, such as sucrose, do not reduce  $\text{Cu}^{2+}$  to  $\text{Cu}^+$ , they are not reducing sugars.

### **12. How does temperature affect enzyme catalysed reaction?**

**Ans:** The speed of enzyme action is affected by temperature. Due to denaturation, there is a dramatic drop in enzyme activity when the temperature rises. Most enzymatic reactions take place below  $450^{\circ}\text{C}$ .

### **13. What is enzymatic competitive inhibition? Give one example?**

**Ans:** Inhibitors are substances that block the enzyme from functioning. Enzymatic competitive inhibition is performed by the substrate, which has a molecular structure that is highly similar to the substrate.

Enzyme + Inhibitor  $\rightarrow$  Enzyme inhibitor complex

For example: Malonate inhibits the function of succinate dehydrogenase because it is chemically similar to succinate substrate.

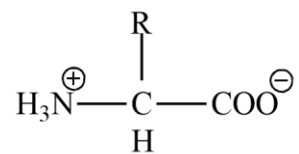
### **14. Why are amino acids also known as substituted methane?**

**Ans:** Amino acids are substituted methane because they have four substituent groups: hydrogen, carboxyl group, amino group, and a variable group. These four substituents are situated on the  $\alpha$  - carbon and hence are known as  $\alpha$  - amino acids.

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**15. Amino acids exist as zwitterions. Give its structure. Why is it formed?**

**Ans:** A zwitterion is a molecule with both positively and negatively charged components but no net electrical charge. It is formed due to ionizable nature of carboxylic and amino group, that is,  $-\text{COOH}$  and  $-\text{NH}_2$  group.



**16. Why do starch give blue black colour with iodine?**

**Ans:** Amylose, a component of starch, is responsible for the creation of a deep blue color when iodine is present.

**17. Why are starch and glycogen more suitable than glucose as a storage product?**

**Ans:** Starch and glycogen are better storage products than glucose because they take up less space as less bulky, and can be hydrolyzed to glucose as needed.

**18. What would happen when salivary amylase which acts on starch in the mouth and in the stomach?**

**Ans:** Salivary amylase converts starch to maltose in the mouth. Amylase activity ceases in the stomach because it cannot function in an acidic environment.

**19. Differentiate between homopolysaccharides and heterosaccharides.**

**Ans: Homopolysaccharides:** It is made up of a single type of monosaccharide unit. For example: starch, glycogen, cellulose.



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**Heterosaccharides:** It is made up of two or more types of monosaccharide units.  
For example: chitin.

**20. Why do physicians recommend vegetable oils rich in polyunsaturated fat for persons suffering from cardiovascular diseases?**

**Ans:** Polyunsaturated oils having fatty acids with one or more double bonds, which do not block arteries due to their high polyunsaturated fatty acid content.

**21. Why does the shelf life of fruits and vegetables increase in a refrigerator?**

**Ans:** Since at low temperature enzymes are inactivated, low temperatures restrict the growth of food ruining microorganisms and also suppress the function of enzymes in food.

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### 3 Marks Questions

#### 1. Enumerate the functions of lipids?

**Ans:** (i) The majority of plant and animal lipids contain storage compounds. Fat is primarily stored in adipose cells in animals.

(ii) During seed germination, oil in oil seed plants offers sustenance to the growing embryo. Cooking uses the oil derived from these seeds.

(iii) Fats give the body energy.

(iv) Fats act as insulators, keeping the body warm. It is deposited beneath the skin.

(v) Phospholipids are structural components of all bio-membranes in the cell.

(vi) Cholesterol serves as a precursor for the synthesis of a variety of hormones, vitamins, and bile salts.

(vii) The lipids that make up the white matter, grey matter, and myelin sheath of neurons.

#### 2. Describe the lock & key hypothesis of enzyme action?

**Ans:** Fischer's lock and key hypothesis of enzyme activity states that if the proper key fits in the right lock, the lock can be opened; otherwise, the lock cannot be unlocked. In order to interpret the preceding in the context of enzyme function, it is assumed that molecules have precise geometric forms. Proteins can operate as enzymes because their form creates a space configuration into which other molecules can fit. The compounds that are acted on by enzymes are referred to as enzyme substrates.

Only substrate molecules with the proper geometric shape can fit into the active site of the enzymes, according to the aforementioned premise. However, under certain conditions, other molecules that are similar to the substrate might potentially bind with the active site of the enzyme. In such instances, molecules may compete with the substrate, causing the process to slow or cease. This is known as competitive inhibition.

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### 3. Describe the structure & function of ATP?

**Ans:** ATP is the primary and universal carrier of chemical energy in the cell. Living cells capture, store, and transport energy in a chemical form, primarily ATP, and it is ATP that serves as a carrier and intermediate source of chemical energy to those reactions in the cell that do not occur simultaneously. Only when chemical energy is released can these reactions occur.

The ATP molecule is made up of a nitrogenous base called adenine, a pentose sugar called ribose, and three inorganic phosphate molecules. Two phosphate bonds have a high energy level and one has a low energy level.

Energy released in a living cell is therefore kept in the chemical bonds of the ATP molecule, which then serves as the cell's primary energy generating and energy demanding material. ATP is broken down into ADP when energy is needed.

ATP → ADP + ip + energy.

### 4. Differentiate between cofactors, coenzymes & prosthetic groups.

**Ans:** Cofactors:

- (i) It is a nonprotein chemical or group that binds to an enzyme.
- (ii) It is required for proper operation and can be biological, inorganic, or metallic.

Coenzymes:

- (i) In a functional enzyme, it is a nonprotein group that is loosely linked to the open enzyme.
- (ii) NAD is a dehydrogenase coenzyme.

Prosthetic group:

- (i) It is a nonprotein chemical or group that binds to an open enzyme.
- (ii) Some prosthetic groups contain cytochrome porphyrin.

### 5. How do enzymes bring about a high rate of chemical conversions?

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**Ans:** Enzymes are known as biological system catalysts because they speed up chemical reactions or their rates. Enzymes bind to the substrate, and the resulting 'enzyme-substrate' complex has a lower activation energy, implying that the 'amount of energy' required to activate the chemical process is smaller, and thus the process is faster. The lower the activation energy, the faster the chemical reactions.

**6. What are nucleic acids? Describe the structure of DNA.**

**Ans:** The acid soluble component of live tissue contains nucleic acids. They are deoxyribonucleotide or ribonucleotide linear polymers. A nucleotide is made up of three different parts.

DNA is a double-stranded structure made up of deoxyribonucleotide polymers. The nucleic acid backbone is made up of alternating pentose sugar and phosphate groups.

(i) The steps consist of nitrogenous bases adenine, guanine, cytosine, and thymine, as well as hydrogen bonds, holding two strands together.

(ii) Two strands are mutually complementary.

(iii) They operate in an antiparallel fashion.

(iv) All organisms include genetic material.

(v) It has the ability to replicate.

(vi) At one end of the strand, 5-c of pentose sugar is free; at the other end, pentose's third carbon is free.

**7. (a) What is enzyme? (b) Give an example of coenzymes. (c) Distinguish between apoenzyme and coenzyme.**

**Ans:** (a) Enzymes are biological catalysts that naturally speed up chemical reactions.

(b) The examples of co-enzyme are NADP, NAD.

(c) Apoenzymes are enzymes that only function in the presence of cofactors. Whereas coenzyme is an organic non-protein cofactor that can be easily separated from the apoenzyme.

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## 5 Marks Questions

### 1. Explain briefly four levels of protein structure?

**Ans:** The four levels of protein structures are explained below:

(a) Primary structure:

A protein that occurs as a lengthy chain of amino acids organized in a certain sequence. For example: polypeptide is non-functional.

(b) Secondary structure:

The first amino acid is known as N-terminal amino acid, while the last is known as C-terminal amino acid. Every fourth amino acid interacts with another by forming a hydrogen bond, and the polypeptide is folded in a helical shape, as in keratin. When two or more polypeptide chains are joined together by intermolecular hydrogen bonds, pleated sheet structure is formed.

(c) Tertiary structure:

The polypeptide is stabilized by folding and coating, which results in the creation of ionic bonds, hydrophobic bonds, or disulfide bridges. It is referred to as tertiary structure. It displays proteins in three dimensions. The biological activity of a protein is determined by its tertiary structure.

(d) Quaternary structure:

These proteins are made up of several polypeptides or subunits, each with its own primary, secondary, and tertiary structure. This is referred to as quaternary structure. Each polypeptide chain serves as a protein component.